

Study of relationship between ABO & Rh blood group and type 2 diabetic mellitus

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Abstract

Background & Objective: The findings of Arid et al, in 1953 regarding association between carcinoma of stomach and B blood group and successively in 1954 regarding association between peptic ulcer and O blood group opened a new approach to find association of blood group with other commonly occurring diseases. But there are conflicts of reports regarding association between diabetic mellitus (DM) (Type 2) and blood groups. Therefore the present study aims to find out whether there is any association between blood group and Type 2 diabetes mellitus. **Methods:** For this study diabetic patients of both sexes of Haldia and Tamluk subdivision reported in our associated Dr. B. C. Roy Hospital, Haldia are considered. The ABO blood group and Rh factor of both the groups were determined using the Tile or Slide testing method and the frequency of occurrence of ABO & Rh blood group among diabetic & non diabetic population was assessed. The frequency distribution of ABO blood group and Rh factor among the entire DM population was compared with that of general non diabetic population by Chi Square test. **Result:** The present study indicates that neither the frequency distribution of ABO group nor the Rh factor of diabetic subjects significantly differs from the non diabetic (control) group. **Conclusion:** The present study suggests that there might have no association between ABO blood group and Rh factor with diabetes mellitus.

Key words: Blood group, Diabetes mellitus, Rh factor.

Introduction

Diabetes mellitus (DM) is a chronic disease and as of 2014, an estimated 387 million people have diabetes worldwide [1] with Type 2 diabetes making up about 90% of the cases [2,3]. This represents 8.3% of the adult population [3], with equal rates in both women and men [4]. The number of people with diabetes is expected to rise to 592 million by 2035[1]. The World Health Organization (WHO) estimated that diabetes resulted in 1.5 million deaths in 2012, making it the 8th leading cause of death [5]. In 2014, the International Diabetes Federation (IDF) estimated that diabetes resulted in 4.9 million deaths [1]. The management of this disease concentrates on keeping blood sugar levels

as close to normal, without causing low blood sugar. This can usually be accomplished with a healthy diet, exercise, weight loss, and use of appropriate medications (insulin in the case of Type 1 diabetes; oral medications, as well as possibly insulin, in Type 2 diabetes). Learning about this disease and actively participating in the treatment of this disease is thus important since complications are far less common and less severe in people who have well-managed blood sugar levels [6,7].

The findings of Arid et al [8] in 1953 regarding association between carcinoma of stomach and B blood group and then again in 1954 [9] regarding association between peptic ulcer and O blood group opened a new approach to find association of blood group with other

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commonly occurring diseases. It is now well established that the blood group exhibits some relation with some diseases like nasopharyngeal carcinoma [10], duodenal ulcer [11], epistaxis [12], anemia [13] and even cardiovascular diseases like coronary artery diseases and cardiac ischemia [14,15]. But there are conflicts of reports regarding association between diabetic mellitus (Type 2) and blood groups [16-18].

Results of a combined series from Lancashire, Oxford showed a significant increase of DM among A blood group population [19] whereas the studies of Anderson & Lauritzen [16] reported an excess of blood group O was found in male diabetics in Copenhagen. Results from Italy [20] and Trinidad [17] showed an increased frequency of blood group B among diabetes. On the other hand in Germany [21] and in Glasgow [22] no significant difference was found between blood groups and DM. Whereas Kamil et. al. [23] reported that there was a negative association between blood groups A and O with DM type 2, with A and O group having less chances of diabetes in *Libya*.

Therefore the object of present study is to find out whether any correlation between ABO & Rh blood group and DM does exist among the population of Haldia & Tamluk subdivision of Purba Medinipur of West Bengal or not.

This study may also help to suggest the particular group of individuals who are prone to DM to take the appropriate and specific preventive measure if such correlation is found between blood group and DM.

Methods

Selection of subjects: For this study diabetic patients of both sexes (non pregnant and premenopausal female) with almost similar socioeconomic status of Haldia and Tamluk subdivision reported in our associated Dr. B. C. Roy Hospital, Haldia from January 2011 to August 2014 are considered. The inclusion criteria are- age groups >18- 60, non smokers and non alcoholic. The patients were already diagnosed to have diabetes and were under treatment and coming for follow up to

Result

The study indicates that neither the frequency distribution of ABO group nor the Rh factor of diabetic subjects significantly differ from the non diabetic (control) group. Statistical analysis by Chi Square test reflects that the Chi Square value is 3.024 which are far less than the 5% (0.05) level of significance (Two tailed p value equals 0.3879 at degree of freedom 3). Hence there is no significant difference between the frequency distribution of diabetic population and frequency distribution of non diabetic population. The apparent association between B blood group (44% in diabetic

hospital for their management are also included in this study. The undiagnosed and untreated patients whose serum glucose concentration (Fasting >126mg/ml, PP >200 mg) [24, 25], was also considered for this study. The patients of Type I DM, diabetic due to hormonal abnormalities like Acromegaly, Cushing's syndrome, Hyperthyroidism, Pheochromocytoma, are excluded from this study. Each subject filled the consent form containing self reported information about their sex, age, physical activity, smoking habits, drinking habits, and history of Acromegaly, Cushing's syndrome, Hyperthyroidism, Pheochromocytoma etc if any. The controls were taken from healthy individuals coming for blood donation at hospital blood bank over this study period. The study was approved by the Institutional ethical committee & has no conflicts of interest.

Collection of blood sample: With all aseptic precaution the whole blood of suspected diabetic patients was collected in fasting condition and also 2 hr after meal (Post Prandial) by venipuncture using disposable syringes. A portion of the blood was used for determination of blood glucose concentration by glucose oxidase method using automated analyzer wherever required, and remaining portion of the blood was used for determination of blood group.

Determination of blood group: The ABO blood group and Rh factor of both the groups were determined using the Tile or Slide testing method [26] with the help of antisera A, antisera-B and antisera-D and finally the frequency of occurrence of ABO & Rh blood group among diabetic & non diabetic population was assessed.

Statistical Analysis: The frequency distribution of ABO blood group and Rh factor was expressed as percentage of each blood group and to establish the relationship between the blood group and DM the frequency distribution (Observed frequency) of blood group among the entire DM population (N=378) was compared with that of general non diabetic population (N=412) by Chi Square test [27] and a P value of 0.05 was considered significant for all the statistical test conducted.

population against 38% in non diabetic population) and O blood group (25% in diabetic population against 32% in non diabetic population) with DM in control and expected (Test) value is also not significant by Fisher's Test (Two tailed p value is 0.8628) using Graph Pad software [27]. It is also observed that there is no significant difference between frequency distribution of ABO and Rh factor of diabetic male and female with that of control group (Table I).

Table I: Demographic distribution of blood group among control and test group.

Blood group	Control group (412)				Test Group (378)			
	Male (278)		Female(134)		Male (156)		Female(122)	
	N	Distribution	N	Distribution	N	Distribution	N	Distribution
A	53	19%	29	22%	26	17%	32	26%
B	111	40%	48	36%	68	44%	56	44%
AB	26	9%	15	11%	16	10%	10	8%
O	88	32%	42	31%	46	29%	24	20%
Rh+	262	94%	125	93%	148	95%	116	95%
Rh-	16	6%	9	7%	8	5%	6	5%

N= Absolute number of individuals

There is also no significant difference between the frequency distribution of blood group of diabetic subjects from that of reference population [28] of this belt(Fig-I).

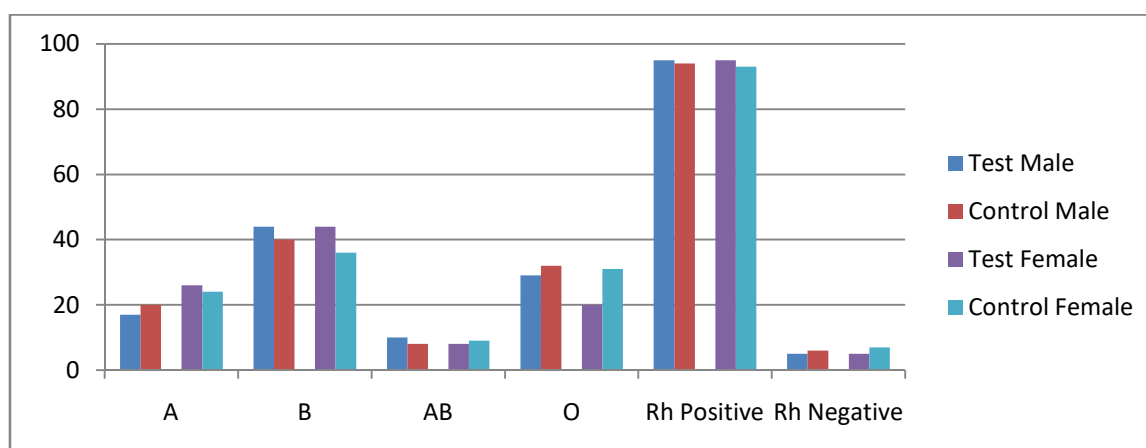


Fig-I: Graphical presentation of frequency distribution of blood group among diabetic and non diabetic population.

Discussion

The data on relationship between the distribution of the ABO blood types and DM is conflicting. Some studies from Bangladesh [29], India [30], Germany[21], and Glasgow [22] reported no association between blood group and DM whereas and some other others showed positive association. An association of DM with blood group A was demonstrated by McConnell and Pyke [19] and this was confirmed by Andersen and Lauritzen [16]. There are many studies which showed a significant excess of blood group A among male diabetics, such as a combined series from Lancashire,

Cheshire, and Oxford [19]. On the other hand there were reports from Italy [20] and Trinidad [17] showing an increased frequency of blood group B among diabetics. Qureshi and Bhatti [31] demonstrated that DM type 2 and ABO blood groups are interrelated and blood group B was more common in DM group.

In addition there are also some reports from Kamil and his group [23] that there was a negative association between A and O blood groups and DM type 2 with both groups being less common in the diabetic group.

Though they reported that, a larger sample study will be needed in Malaysia in different racial groups to verify their findings, their results are interesting in terms of the negative association of A and O groups with DM, which seem to have protective effect. However, it is premature to make any etiological conclusions from the study unless a large sample study is being conducted.

As obvious from the above discussion, certain populations do show a positive association with ABO blood groups but the evidence is mixed. The present study indicates that there is no significant correlation between ABO & Rh blood groups with DM which collaborate with the study of Doll et al in 1961 [32] which reported that the occurrence of DM was independent of the ABO blood groups. The studies from Iran [33] also suggested the negative correlation between blood group and Type 2 DM.

We hereby conclude that the results of different researchers studying on this field are conflicting and the present study among the population belt in Haldia & Tamluk subdivision, West Bengal, India also tends to add to this conflict. This conflicting results may be due to the fact that there is significant heterogeneity between areas and for this reason the data from different areas can not be pooled. As there were several controversies in different ethnic groups, we may suggest performing more developed studies with large sample size considering ethnicity as a contributing factor in patients with diabetic mellitus.

Conclusion

The present study indicates that there is no significant co-relation between frequency of ABO blood groups and Rh factors with occurrence of diabetes mellitus.

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